

African Jewelfish (*Hemichromis bimaculatus*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, April 2011

Revised, September 2018

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https://commons.wikimedia.org/wiki/File:Hemichromis_bimaculatus1.jpg. (September 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2018):

“Africa: widely distributed in West Africa, where it is known from most hydrographic basins [Teugels and Thys van den Audenaerde 2003], associated with forested biotopes [Daget and Teugels 1991, Lamboj 2004]. Also reported from coastal basins of Cameroon, Democratic Republic of the Congo and Nile basin [Teugels and Thys van den Audenaerde 1992], but at least its presence in Cameroon is unconfirmed in [Stiassny et al. 2008]. [Lamboj 2004] limits this species to Guinea, Sierra Leone and Liberia.”

From Azeroual and Lalèye (2010):

“This species is widely distributed throughout western Africa, but has also been recorded from Algeria to Egypt.”

“Northern Africa: Within this region this species is very rare. It used to be caught from the coastal lagoons, especially Lake Mariut (Egypt) and Algeria. Its [*sic*] found in Tunisia in the wadis of Kebili in the south of Tunisia and in wadis near Chott Melrhir in eastern Algeria (Kraiem, pers. comm.), and Egypt (Wadi El Rayan Lakes).”

“Western Africa: It is known from most hydrographic basins in western Africa.”

Status in the United States

It is not certain if this species is present in the United States, or if records pertain to *H. letourneuxi*.

From NatureServe (2018):

“Introduced and established in Dade County, Florida, [...] (Nelson 1983).”

From Nico et al. (2018):

“Prior to the 1990s, most published references to introduced populations of this species [*Hemichromis letourneuxi*] taken in Florida were incorrectly identified or listed as *Hemichromis bimaculatus* (Smith-Vaniz, personal communication).”

This species is in trade in the United States.

From Goliad Farms (2018):

“*HEMICHROMIS BIMACULATUS* ‘SCARLET JEWEL CICHLID’”

“\$20.00”

“There is a lot of confusion about the scientific name for the species and it [*sic*] likely hybrid, so we treat it as an aquarium strain.”

Means of Introductions in the United States

No information available.

Remarks

From Froese and Pauly (2018):

“Species boundaries in the genus *Hemichromis* remain unclear [Stiassny et al. 2008].”

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Labroidei
Family Cichlidae
Genus *Hemichromis*
Species *Hemichromis bimaculatus* Gill, 1862”

From Fricke et al. (2018):

“Current status: Valid as *Hemichromis bimaculatus* Gill 1862. Cichlidae: Pseudocrenilabrinae.”

Size, Weight, and Age Range

From Froese and Pauly (2018):

“Max length : 13.6 cm SL male/unsexed; [Entsua-Mensah et al. 1995]; common length : 7.5 cm TL male/unsexed; [Hugg 1996]; max. published weight: 10.00 g [Ita 1984]”

From Guezi and Kara (2015):

“*H. bimaculatus* is a short living species in Oued Righ Valley. Its size ranged from 3.6 to 10.2 cm and its age is between 1 and 3 years for males and females. As reported by Indira et al. (2013), the longevity can attain 5 years.”

Environment

From Froese and Pauly (2018):

“Freshwater; brackish; benthopelagic; pH range: 6.5 - 7.5; dH range: 4 - 16; potamodromous [Riede 2004]. [...] 21°C - 23°C [Riehl and Baensch 1991; assumed to be recommended aquarium temperature range];”

Climate/Range

From Froese and Pauly (2018):

“Tropical; [...] 11°N - 4°N”

Distribution Outside the United States

Native

From Froese and Pauly (2018):

“Africa: widely distributed in West Africa, where it is known from most hydrographic basins [Teugels and Thys van den Audenaerde 2003], associated with forested biotopes [Daget and Teugels 1991, Lamboj 2004]. Also reported from coastal basins of Cameroon, Democratic Republic of the Congo and Nile basin [Teugels and Thys van den Audenaerde 1992], but at least its presence in Cameroon is unconfirmed in [Stiassny et al. 2008]. [Lamboj 2004] limits this species to Guinea, Sierra Leone and Liberia.”

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“Western Africa: It is known from most hydrographic basins in western Africa.”

Introduced

From NatureServe (2018):

“Introduced and established in [...] Banff National Park, Alberta (Nelson 1983).”

Means of Introduction Outside the United States

No information available.

Short Description

From Boulenger (1915):

“Depth of body $2\frac{1}{4}$ to 3 times in total length, length of head $2\frac{4}{5}$ to $3\frac{1}{6}$ times. Head $1\frac{1}{2}$ to 2 times as long as broad ; snout with straight or convex upper profile, as long as or a little longer than eye, shorter in the very young; eye $2\frac{1}{2}$ (young) to 4 times in length of head, 1 to $1\frac{1}{3}$ times in interorbital width ; mouth extending to below anterior border of eye, or not quite so far; middle outer teeth not or but feebly enlarged ; usually one, very rarely two series of minute teeth, if any, behind the

outer; 3 to 5 series of scales on the cheek, width of scaly part equal to or a little less than diameter of eye. Gill-rakers short, 8 to 10 on lower part of anterior arch. Dorsal XIII-XV 9-13; spines increasing in length to the last, which measures $\frac{2}{5}$ to $\frac{4}{5}$ length of head and $\frac{3}{5}$ to $\frac{3}{4}$ longest soft rays. Anal III 7-9; third spine as long as or shorter than last dorsal. Pectoral $\frac{3}{5}$ to $\frac{4}{5}$ length of head, not extending to vertical of origin of anal. Ventral produced into a filament, reaching vent or anal. Caudal rounded. Caudal peduncle a little deeper than long. Scales cycloid, 25-29 $\frac{2\frac{1}{2}-3}{9-11}$; lateral lines $\frac{15-19}{7-11}$. Yellowish brown or red, with or without blue dots; a large bluish-black spot on the gill-cover, another on the middle of the side of the body, and often a third at the base of the caudal fin, these spots sometimes surrounded by a pale circle; ill-defined dark cross-bars may be present on the body; small irregular dark spots sometimes present on the body; vertical fins greyish white, edged with brown, with or without crimson and pale blue dots.”

Biology

From Hyslop (1987):

“Welcomme (1979) classifies the species as a carnivorous bottom feeder occurring mainly in vegetated areas, a microhabitat distribution substantiated by Ewer (1966) and Holden & Reed (1972).”

[...] only a limited range of potential food sources is available to fishes occupying the stream: (1) terrestrial invertebrates, (2) detritus, (3) invertebrates associated with the detritus food web, (4) filamentous algae and (5) other fishes. It appears from the findings on dietary composition presented here that *H. bimaculatus* concentrates upon the third of these while taking limited amounts of filamentous algae. Examination of intestinal contents indicated little digestion of the latter material had occurred i.e. cell walls were intact. The range of food items taken indicates that, within the constraints of the habitat occupied, *H. bimaculatus* is a generalized invertebrate predator which probably takes food items according to their abundance, [...].”

“Examination of ovaries during determination of fecundity showed that at any one time gametes were present at a variety of stages of maturation ranging from oocytes to mature eggs. This, in combination with low fecundity and relatively large diameter of mature eggs, is probably indicative of partial spawning (Welcomme, 1979).”

From Guezi and Kara (2015):

“*Hemichromis bimaculatus* is a benthopelagic fish that frequents fresh and brackish waters. It lives in zones with sandy bottoms or muds (Page and Burr, 1991), where it looks for prey (relatively great crustaceans, insects and other fishes) (Blay, 1985). The reproductive behaviour of this species contains fixed patterns, which are often organized in territorial, nest building, courtship and parental phases (Hildegard, 1985).”

Human Uses

From Azeroual and Lalèyè (2010):

“Considered the true 'jewel fish' of aquarists, this species is also used as an experimental animal by physiologists and ethologists. The level of captive breeding for aquarium trade is unknown.”

This species is in trade in the United States.

From Goliad Farms (2018):

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Diseases

From Eddyani et al. (2004):

“*Mycobacterium ulcerans* is an environmental organism that causes Buruli ulcer (BU), a necrotizing disease of skin and bone that prevails in West and Central Africa. Although BU is closely associated with tropical wetlands, the epidemiology of the disease remains poorly understood.”

“In October 2001, 40 fish were collected from four bodies of water in the Ga district of Ghana, where BU is endemic.”

“Among the cichlids, one *H. bimaculatus* fish tested positive for *M. ulcerans*.”

No OIE-reportable diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2018):

“Harmless”

3 Impacts of Introductions

No information available.

4 Global Distribution

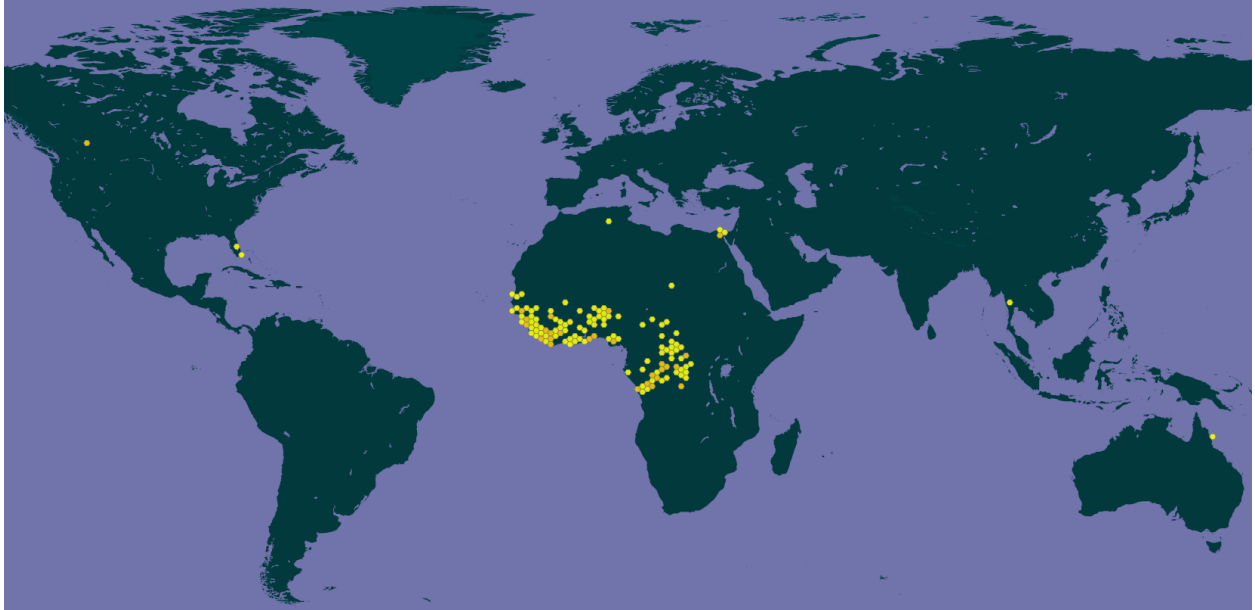


Figure 1. Known global distribution of *Hemichromis bimaculatus*. Map from GBIF Secretariat (2017). The following occurrences were excluded as outliers from climate matching: (1) points in Banff National Park, Alberta, Canada, where the population occurs in thermal springs; (2) points in Florida that may be misidentifications of *Hemichromis letourneuxi*; and (3) points in Australia and Thailand that appear to be captive specimens.

5 Distribution Within the United States

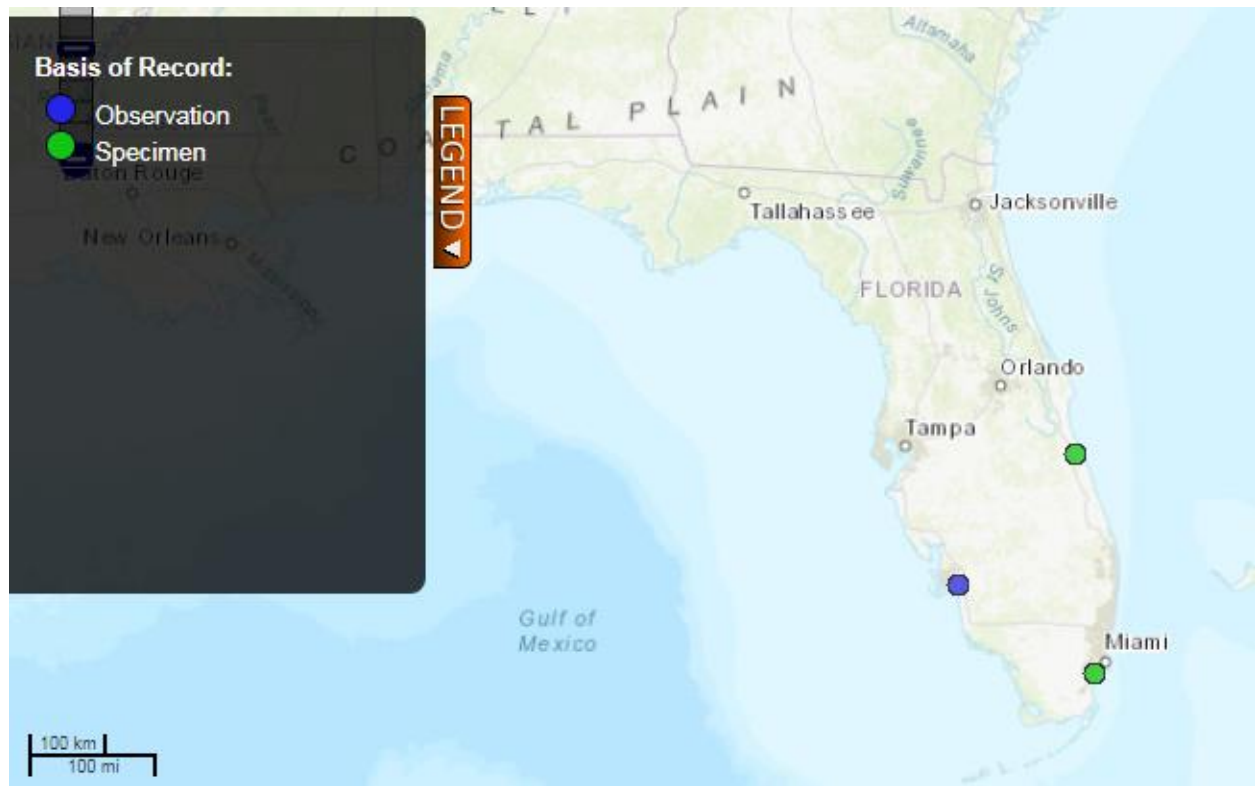


Figure 2. Known distribution of *Hemichromis bimaculatus* in the United States according to BISON (2018). Specimens of *H. bimaculatus* on the Atlantic Coast of Florida were collected in the 1990s and therefore may actually be *H. letourneuxi* according to Nico et al. (2018). The record from the Gulf Coast could not be verified. These occurrence points were not included in climate match analysis.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous United States was 0.023, which is a medium climate match. A Climate 6 score of between 0.005 and 0.103 indicates a medium climate match. Florida and California had a high climate score, while Arizona and Nevada had a medium climate score. In general, the southwestern United States, peninsular Florida, and the Gulf Coast had a medium climate match. The climate match was low in the rest of the contiguous United States, except in south central California, scattered locations in Arizona, and far southern Florida, which had a high match.

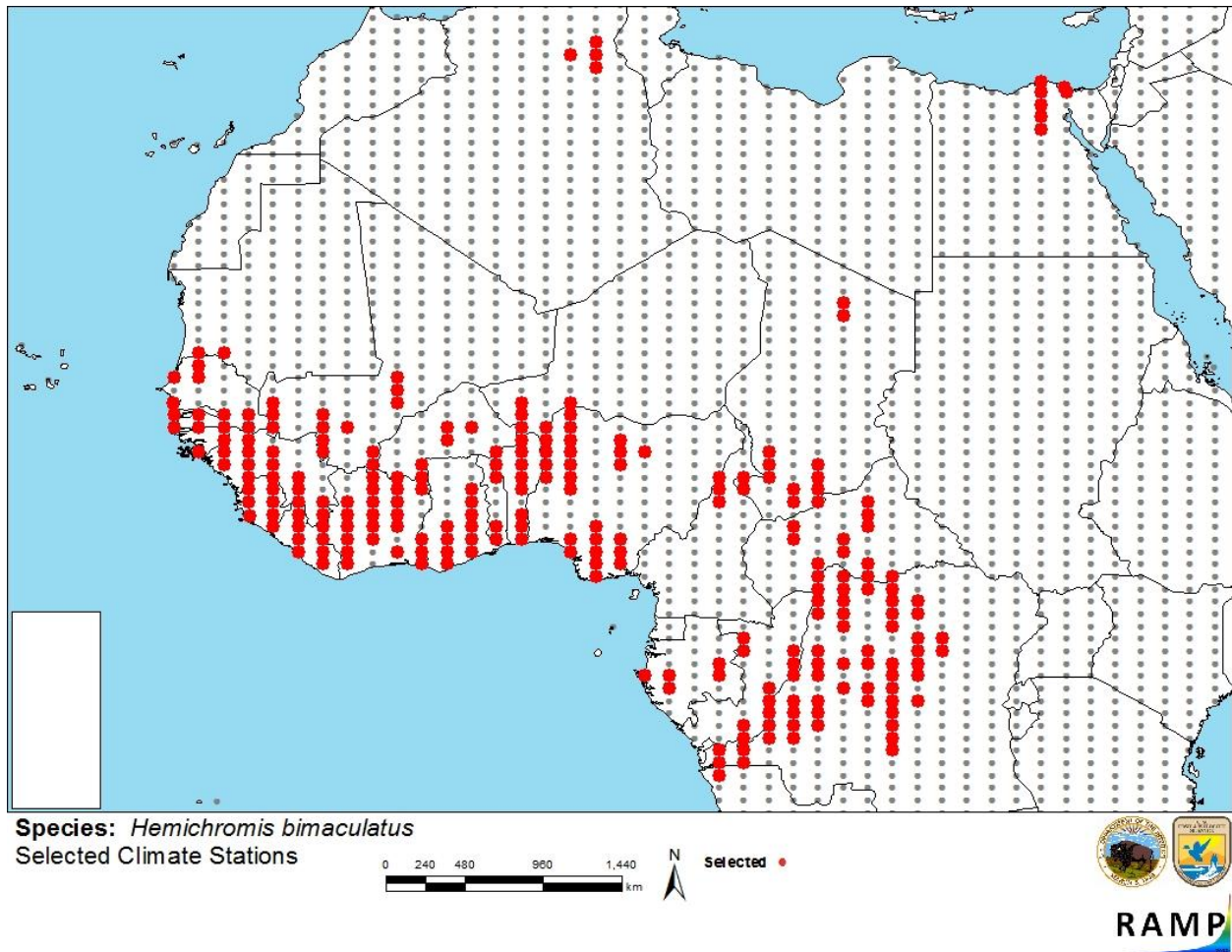


Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; Egypt, Algeria, Senegal, Gambia, Guinea-Bissau, Guinea, Mali, Sierra Leone, Liberia, Ivory Coast, Burkina Faso, Ghana, Togo, Benin, Nigeria, Niger, Chad, Cameroon, Central African Republic, Gabon, Republic of the Congo, and Democratic Republic of the Congo) and non-source locations (gray) for *Hemichromis bimaculatus* climate matching. Source locations from GBIF Secretariat (2017).

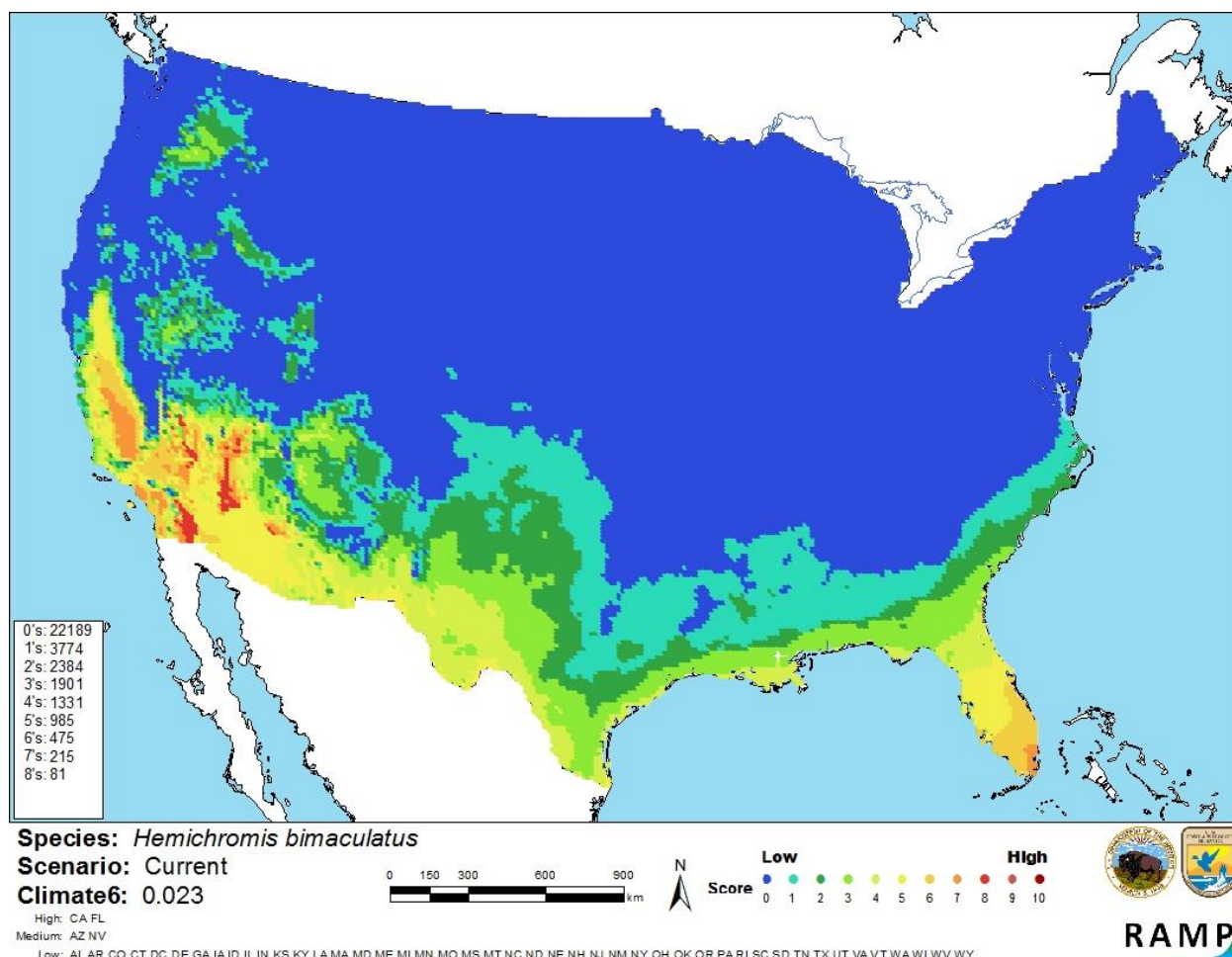


Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Hemichromis bimaculatus* in the contiguous United States based on source locations reported by GBIF Secretariat (2017). 0=Lowest match, 10=Highest match.

The “High”, “Medium”, and “Low” climate match categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

There is adequate information available about the biology, ecology, and distribution of *Hemichromis bimaculatus*. This species has been reported as introduced outside of its native range; however, no information is available about impacts of *H. bimaculatus* introductions. *H. bimaculatus* may have been introduced to the contiguous United States, but it also may have been a misidentification of *H. letourneuxi*. Taxonomy within the genus *Hemichromis* remains unclear. Because of this, the certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Hemichromis bimaculatus, the African Jewelfish, is a freshwater cichlid species native to West Africa. It is used in the aquarium trade and is in trade in the United States. *H. bimaculatus* has been introduced to and established in thermal springs in Canada. It is possible that this species has been introduced to Florida, but the similar species *H. letourneuxi* has been misidentified as *H. bimaculatus*, so this species' presence in the United States is not certain. *H. bimaculatus* has a medium climate match with the contiguous United States. The climate match was highest in Florida and the southwestern United States. No information was found on impacts of introductions of this species, therefore history of invasiveness is "none documented." Further information is needed to adequately assess the risk *H. bimaculatus* poses. The certainty of this assessment is low, and the overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): Medium**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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